

**Space Science Seminar**  
**Thursday, 2014 September 11**  
**10:30 a.m.**  
**NSSTC/2096**

**What Does Titan Tell Us about Preparing for  
Exascale Supercomputers?**

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Modeling and simulation with petascale computing has supercharged the process of innovation, dramatically accelerating time-to-insight and time-to-discovery. The Titan supercomputer is the Department of Energy, Office of Science's flagship Cray XK7 supercomputer managed by the Oak Ridge Leadership Computing Facility (OLCF). With its hybrid, accelerated architecture of traditional CPUs and graphics processing units (GPUs), Titan allows advanced scientific applications to reach speeds exceeding 20 petaflops with a marginal increase in electrical power demand over the previous generation leadership-class supercomputer. I will summarize the benefits, challenges, and lessons learned in deploying Titan and in preparing applications to move from conventional CPU architectures to hybrid, accelerated architectures, with a focus on early-science outcomes from Titan in diverse areas such as materials sciences, nuclear energy, and engineering sciences. I will also discuss research outcomes from a growing number of industrial partnerships. We will discuss implications for the research community as we prepare for exascale computational science and engineering within the next decade. I will also provide an overview of user programs at the Oak Ridge Leadership Computing Facility with specific information on how researchers may apply for allocations of computing resources.

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